Claims

1. A robot capable of detecting an edge, comprising:

a body;

at least one leg, connected to the body, including a driving mechanism to move the robot; and

an edge detection system including:

at least one infrared emitter;

a signal receiving device to detect a signal emitted by the infrared emitter after the signal has been reflected; and

at least one edge detection element;

wherein the edge detection system is adapted to detect an edge based on feedback received from the signal receiving device; and

wherein the driving mechanism slows down after an edge has been detected in response to the feedback received from the signal receiving device, thereby allowing the edge detection element to confirm that there is an edge.

2. The robot of claim 1, wherein the edge detection element indicates that there is an edge if an end wheel of the robot travels a predetermined distance downward.

3. The robot of claim 1, wherein the edge detection element comprises:

a first switch that closes when a front end wheel travels the predetermined distance downward; and

a second switch that closes when a rear end wheel travels the predetermined distance downward.

4. The robot of claim 4, wherein each of the first switch and the second switch comprise a leaf switch.

5. The robot of claim 4, wherein the closing of the first switch completes a first circuit causing a signal to be sent to the robot indicating that an edge was detected near the front end wheel.

6. The robot of claim 5, wherein the closing of the second switch completes a second circuit causing a signal to be sent to the robot indicating that an edge was detected near the rear end wheel.

7. The robot of claim 3, wherein:

closure of the first switch causes the driving mechanism to move the robot

backward; and

closure of the second switch causes the driving mechanism to move the robot forward.

8. A robot capable of detecting an edge, comprising:

a body;

a left leg and a right leg to keep the body elevated;

the right leg including:

a right driving mechanism;

a right center wheel, rotated by the right driving mechanism;

a right front end wheel;

a first edge detection switch that closes in response to the right front end wheel moving at least a predetermined distance downward;

a right rear end wheel; and

a second edge detection switch that closes in response to the right rear end wheel moving at least a predetermined distance downward;

the left leg including:

a left driving mechanism;

a left center wheel, rotated by the left driving mechanism;

a left front end wheel;

a third edge detection switch that closes in response to the left front end wheel moving at least a predetermined distance downward;

a left rear end wheel;

a forth edge detection switch that closes in response to the left rear end wheel moving at least a predetermined distance downward;

wherein the left and right driving mechanisms move the robot in a direction away from a detected edge based on which of the first, second, third and forth switches close.

9. The robot of claim 8, wherein each the edge detection switch comprises a leaf switch.

10. The robot of claim 9, further comprising an infrared transceiver subsystem to detect an edge, wherein the left and right driving mechanisms will slow down movement of the robot in response to the infrared transceiver subsystem indicating detection of an edge, thereby allowing one of the edge detection switches to confirm that there is an edge.

11. The robot of claim 8, wherein the infrared transceiver subsystem includes:

at least one infrared emitter; and

a signal receiving device to detect a signal emitted by the infrared emitter after the signal has been reflected.

12. The robot of claim 8, wherein the right front and rear end wheels and the left front and rear end wheels rotate freely upon contact with a surface.

13. The robot of claim 8, wherein:

the right front and rear end wheels are each pivotally mounted relative to the right center wheel; and

the left font and rear end wheels are each pivotally mounted relative to the left center wheel.

14. An edge detection system for preventing a moving robot from traveling off an edge, including:

a infrared transceiver subsystem for detecting an edge; and

an edge detection element to confirm whether the infrared transceiver subsystem actually detected an edge, and to detect an edge not detected by the infrared transceiver subsystem;

the edge detection element comprising a switch that closes in response to a wheel

traveling a predetermined distance downward.

15. The system of claim 14, wherein detection of an edge by the infrared transceiver subsystem causes movement of the robot to slow down, thereby providing more time for the edge detection element to confirm whether the infrared transceiver subsystem actually detected an edge.

16. The system of claim 14, wherein closing of the switch causes the robot to not continue in its current direction of travel.

17. The system of claim 14, wherein closing of the switch causes the robot to change its direction of travel.

18. The system of claim 14, wherein the edge detection switch comprises a leaf switch.

19. The system of claim 14, wherein the closing of the switch completes a circuit causing a signal to be sent to the robot indicating that an edge was detected.

20. The system of claim 14, wherein the infrared transceiver subsystem includes:

at least one infrared emitter; and

a signal receiving device to detect a signal emitted by the infrared emitter after the signal has reflected off a surface.

21. A robot capable of detecting an edge, comprising:

a driving mechanism to move the robot along a surface; and

an edge detection system including:

a plurality of infrared emitters each directed at a different angle with respect to the surface, the emitters alternately emitting signals such that only one of the emitters emits a signal at one time;

a signal receiving device to detect signals emitted by the infrared emitters after the signals have been reflected; and

wherein the edge detection system is adapted to detect an edge based on feedback received from the signal receiving device.

22. The robot of claim 21, wherein the driving mechanism slows down after an edge has been detected in response to the feedback received from the signal receiving device

23. The robot of claim 22, further comprising:

at least one edge detection element to detect an edge not detected by the edge detection system.

24. The robot of claim 23, further comprising:

at least one edge detection element to confirm a detection of an edge by the edge detection system.

25. A robot capable of detecting an edge, comprising:

a body with a first portion that is adapted to be located proximal to the ground and a second portion that is adapted to be located distal from the ground;

a motor that can move the body;

an edge detection system including:

at least one infrared emitter;

a signal receiving device that can detect a signal emitted from the infrared emitter after the signal has been reflected; and

wherein one of the infrared emitter and the signal receiving device is located more adjacent to the second portion of the body than is the other of the infrared emitter and the signal receiving device.

26. A robot capable of detecting an edge, comprising:

a body with a first portion that is adapted to be located proximal to the ground and a second portion that is adapted to be located distal from the ground;

a motor that can move the body;

an edge detection system including:

a plurality of radiation emitters;

a signal receiving device that can detect radiation emitted from the emitters after the signals have been reflected; and

wherein each emitter is directed at a different angle with respect to the ground when the first portion of the body is located proximate to the ground.

27. The robot of claim 26, wherein only one of the emitters emits a signal at a time to allow the signal receiving device to know which emitter sent a signal whose reflection is detected.

28. The robot of claim 27, wherein the plurality of emitters alternately emit signals.

29. The robot of claim 27, wherein the plurality of emitters emit pulses of radiation.

30. The robot of claim 27, wherein the plurality of emitters emit radiation signals at different intervals.

31. A robot capable of detecting an edge, comprising:

a structure including a lower portion, from which extends at least one wheel, and an upper portion extending above the lower portion;

a motor that can rotate the at least one wheel to thereby move the structure;

an edge detection system located in the upper portion of the structure, the edge detection system including:

a plurality of radiation emitters each emitting radiation at a different angle and a different time with respect to one another; and

a signal receiving device that can detect signals emitted from the emitters after the signals have been reflected.

32. A robot capable of detecting an irregularity, comprising:

a body with a first portion which is adapted to be located proximal to the ground and a second portion which is adapted to be located distal from the ground;

a motor that can move the body;

an irregularity detection system including:

at least one radiation emitter;

a signal receiving device that can detect a signal emitted from the one radiation emitter after the signal has been reflected off an irregularity; and

wherein one of the radiation emitter and the signal receiving device is located more adjacent to the second portion of the body than is the other of the radiation emitter and the signal receiving device.

33. The robot of claim 32, wherein to the irregularity detection system the lack of a detected signal can indicate a drop off.

34. A robot capable of detecting an edge, comprising:

a motor that can move the robot;

an edge detection system, including:

a left plurality of radiation emitters each directed at a different angle with respect to one another; and

a right plurality of radiation emitters each directed at a different angle with respect to one another;

a signal receiving device that can detect a signals emitted from the emitters after the signals have been reflected;

wherein only one of the emitters, in both the first and second plurality of emitters, emits a signal at a time to allow the signal receiving device to know which emitter sent a signal whose reflection is detected.

35. The robot of claim 34, wherein the robot can detect a general distance of an irregularity and whether the irregularity is located generally left or right of the body based on detected signals that have been reflected.

36. The robot of claim 25, wherein at least one of a detection or a signal or a lack of a detection of a signal is communicated to a micro-controller unit that controls the motor.

37. The robot of claim 26, wherein at least one of a detection or a signal or a lack of a detection of a signal is communicated to a micro-controller unit that controls the motor.

38. The robot of claim 31, wherein at least one of a detection or a signal or a lack of a detection of a signal is communicated to a micro-controller unit that controls the motor.

39. The robot of claim 32, wherein at least one of a detection or a signal or a lack of a detection of a signal is communicated to a micro-controller unit that controls the motor.

40. The robot of claim 34, wherein at least one of a detection or a signal or a lack of a detection of a signal is communicated to a micro-controller unit that controls the motor.